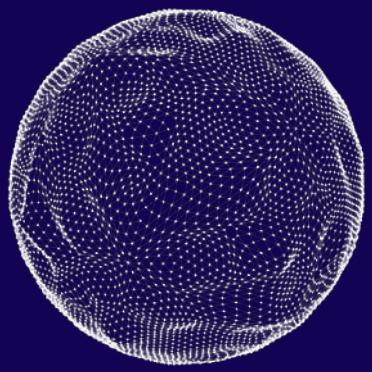


HIP-MED

Hyperspectral Imaging for Precision Medicine in cancer Diagnostics

PUBLIC SUMMARY

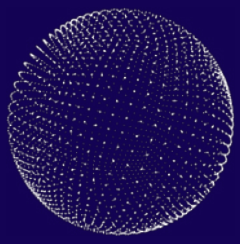
Cancer therapy is facing huge challenges as it attempts to implement personalized medicine, due to the many different types and stages of this complex disease and the many different available treatments. Our main objective in this project is to develop and demonstrate a system that will provide pathologists a better characterization of the tumour thus, improving diagnosis quality, saving precious time and providing decision support metrics for treatment decisions.

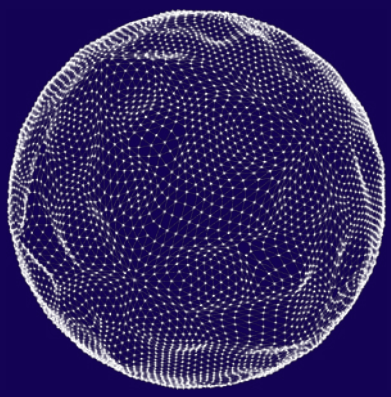
Accurate cancer diagnosis requires to combine specific biomarkers and morphology. The protein expression profile of the cells, as seen using different biomarkers, enables the pathologist to identify the type and state of different cells in the tumour and the morphological information is important to understand the shapes of the cells and relationships between cells. Together, these different aspects allow to diagnose the tumor's type and stage. However, while 4 to 30 biomarkers are typically required for diagnosis, traditional pathology methods are limited to 1 to 2 biomarkers per pathological slide, thus requiring multiple slides which results in a long and inefficient process.

In some cases, the required amount of tissue is unavailable and an additional biopsy is needed. State-of-the-art multiplex imaging systems are trying to overcome these limitations by imaging several biomarkers on the same slide. However, none has been able so far to become a serious candidate for regular clinical work. For example, mass-spectroscopy based tools are able to differentiate many biomarkers, but they are prohibitively expensive, complex and slow. Likewise, optical systems using multiple stages of staining and washing of biomarkers are not sufficiently reliable, and other methods based on optical filters are limited in the number and choice of biomarkers.

Pentaomix was established based on the success of the ATTRACT Phase1 COSMIC project, in which hyperspectral imaging was demonstrated to enable reliable identification of cancer cells in multiple cancer types. Pentaomix is developing a breakthrough rapid hyperspectral scanning system for precision medicine which will enable multiplex imaging to answer this unmet need, and could reach wide clinical use.

In this project, we will develop and demonstrate the ability of the system to measure multiple biomarkers on the same slide. Additionally, we will develop AI-based algorithms and image analysis tools to help pathologists make the best use of the system. To demonstrate the system's clinical value, we will perform a retrospective clinical study in collaboration with the Sheba Medical Center on hematological malignancies. We will demonstrate the ability of our system to assist pathologist in diagnosing complex cancer cases while saving valuable time and effort. Additional developments of advanced optical and computational methods which can further improve the product will be explored in Garini's lab at the Technion and Stern's lab at Ben Gurion University.





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